

WHAT IS CLAIMED IS:

1. A control information rewriting system for a vehicle comprising:

an electronic control unit mounted in the vehicle for a vehicle control and having control information stored in electrically rewritable nonvolatile memory for the vehicle control;

a rewriting device connectable to the electronic control unit for rewriting the control information; and

a control center for performing data communication with the rewriting device,

wherein the control center includes

storing means storing the predetermined access information, identification information of the rewriting device and associated information associated with the identification information, and

legitimacy determining means for acquiring the identification information and the associated information of the rewriting device in data communication with the rewriting device, and transmitting and not transmitting access information stored in the storing means to the rewriting device when an association relationship of the acquired information matches and does not match an association relationship stored in the storing means thereby to enable and disable rewriting operation of the rewriting device, respectively.

2. The control information rewriting system as in claim 1, wherein:

the rewriting device acquires from the control center as the access information a function  $f$  specific to a function  $F$  stored in the electronic control unit, and transmits to the electronic control unit a function value  $f(r)$  specific to a predetermined value  $r$  transmitted from the electronic control unit; and

the electronic control unit determines that the rewriting device is legitimate if a function value  $F(f(r))$  specific to the function value  $f(r)$  transmitted from the rewriting device corresponds to the transmitted predetermined value  $r$ .

3. The control information rewriting system as in claim 2, wherein:

the predetermined value  $r$  is a random number generated by the electronic control unit.

4. The control information rewriting system as in claim 1, wherein:

the electronic control unit refuses access from the rewriting device for a fixed period, when determining a predetermined number of times that the rewriting device is not legitimate.

5. The control information rewriting system as in claim 1, wherein:

the associated information is inputted to the rewriting device by a user every time a state wherein data communication with the control center is possible is established; and

the rewriting device transmits the associated information inputted by the user to the control center together with the identification information.

6. The control information rewriting system as in claim 1, wherein:

a data communication possible state is established between the control center and the rewriting device by way of a telephone network; and

the control center acquires the telephone number of the rewriting device as the associated information, when the data communication possible state is established.

7. The control information rewriting system as in claim 1, wherein:

the control center refuses access from the rewriting device for a fixed period when non-matching of the association relationship is determined by the legitimacy determining means a predetermined number of times.

8. The control information rewriting system as in claim 1, wherein:

the control center further includes modification data storing means storing modification data of the control information; and

the control center transmits the modification data to the rewriting device when the electronic control unit determines that the rewriting device is legitimate.

9. The control information rewriting system as in claim 8, wherein:

the electronic control unit transmits vehicle information to the rewriting device when determining that the rewriting device is legitimate; and

the control center further includes update history storing means storing an update history of the control information pertaining to the vehicle, refers to the update history stored in the update history storing means on the basis of the vehicle information when the vehicle information from the electronic control unit is transmitted by the rewriting device, determines necessity of rewriting of the control information in that vehicle, and transmits the modification data to the rewriting device when determining that rewriting is necessary.

10. The control information rewriting system as in claim 1, wherein:

the control center updates update history specific to

the vehicle when rewriting of control information is completed by the electronic control unit.

11. The control information rewriting system as in claim 1, wherein:

the rewriting device erases the predetermined access information when rewriting of the control information is completed by the electronic control unit.

12. The control information rewriting system as in claim 1, wherein:

the rewriting device stops rewriting of the control information after a data communication possible state is established between the rewriting device and the control center, if data communication between the rewriting device and the control center becomes impossible before rewriting of the control information is completed by the electronic control unit.

13. A control center for communication with a control information rewriting device which rewrites control information stored in a nonvolatile memory, the control center comprising:

storing means storing associated information associated with identification information of the rewriting device; and

legitimacy determining means for acquiring the associated information of the rewriting device in data communication with the rewriting device, and transmitting and

not transmitting rewriting permission to the rewriting device when an association relationship of the acquired identification corresponds and does not correspond to the associated information stored in the storing means, respectively, thereby to control rewriting operation of the rewriting device.

14. The control center as in claim 13, wherein:

the storing means stores a history of rewriting of the control information.

15. The control center as in claim 13, further comprising:

control information transmitting means for transmitting modification data of the control information to the rewriting device.

16. The control center as in claim 14, further comprising:

determining means for determining whether the modification data should be transmitted to the rewriting device based on the history stored in the storing means.

17. The control center as in claim 14, further comprising:

history updating means for updating the history stored in the storing means when receiving data of completion of control information rewriting from the rewriting device.

18. A control center for communication with a control information rewriting device which rewrites control information

stored in an electronic control unit, the control center comprising:

a processing unit programmed to receive information specific to the electronic control unit from the rewriting device, determine a modification data to which the control information is to be rewritten, and transmit the determined modification data to the rewriting device.

19. The control center as in claim 18, wherein:

the processing unit is further programmed to determine whether the rewriting device is legitimate, and permit the rewriting device to rewrite the modification data only when determining that the rewriting device is legitimate.

20. The control center as in claim 19, further comprising:

storing means storing identification information of the rewriting device,

wherein the processing unit is further programmed to compare an association relation of identification information and association information acquired from the rewriting device with an association relation stored in the storing means, and determine that the rewriting device is legitimate when the compared association relations match.

21. The control center as in claim 18, wherein:

the processing unit is further programmed to update a history of rewriting operation of the rewriting device.

22. The control center as in claim 21, wherein:

the processing unit is further programmed to determine whether rewriting of the control information is necessary by referring to the history of rewriting operation based on the information specific to the electronic control unit and received from the rewriting device, and transmit information indicative of completion of the rewriting operation to the rewriting device when determining that rewriting is not necessary.

23. A rewriting device for rewriting control information stored in an electronic control unit while communicating with an external device, the rewriting device comprising:

receiving means for receiving a rewriting permission from the external device; and

control information transmitting means for acquiring the control information from the external device after executing predetermined processing with the electronic control unit in response to the rewriting permission, and transmitting the control information to the electronic control unit.

24. The rewriting device as in claim 23, further comprising:

identification information transmitting means for transmitting identification information of the rewriting device to the external device, so that the external device transmits the rewriting permission when the identification information is appropriate.



25. A rewriting device for rewriting control information stored in an electronic control unit with modification data while communicating with an external device, the rewriting device comprising:

specific information receiving means for receiving specific information from the electronic control unit;

specific information transmitting means for transmitting the specific information to the external device;

modification data receiving means for receiving from the external device the modification data corresponding to the specific information; and

control information transmitting means for transmitting the modification data to the electronic control unit.

26. A control information rewriting system for a vehicle comprising:

an electronic control unit mounted in the vehicle for a vehicle control and having control information stored in electrically rewritable nonvolatile memory for the vehicle control;

a rewriting device connectable to the electronic control unit for rewriting the control information by using predetermined access information; and

a control center for performing data communication with the rewriting device,

wherein the rewriting device converts data received

from the electronic control unit based on the access information upon receiving the access information from the control center and transmits the converted data to the electronic control unit.

27. The control information rewriting system as in claim 26, wherein:

the rewriting device erases the access information received from the control center after rewriting has been completed normally in the electronic control unit.

28. An electronic control unit for rewriting information with control information transmitted from a rewriting device, the unit comprising:

storing means storing the information;

transmitting means for transmitting specific information specific to the electronic control unit to the rewriting device;

receiving means for receiving the control information selected based on the specific information from the rewriting device; and

rewriting means for rewriting the control information in the storing means.

29. The electronic control unit as in claim 28, further comprising:

legitimacy determining means for determining whether the rewriting device is legitimate and allowing the transmitting

means to transmit the specific information to the rewriting device only when the legitimacy is determined.

30. A control information rewriting system for a vehicle comprising:

an electronic control unit mounted in the vehicle for a vehicle control and having control information stored in electrically rewritable nonvolatile memory for the vehicle control;

a rewriting device connectable to the electronic control unit for rewriting the control information by using predetermined access information; and

a control center for performing data communication with the rewriting device,

wherein the electronic control unit determines whether the rewriting device is legitimate by receiving information which is formed by the rewriting device based on the access information received from the control center.

31. The control information rewriting system as in claim 30, wherein:

the electronic control unit outputs predetermined data to the rewriting device, receives converted data which is converted from the predetermined data by the rewriting device based on the access information, and determines the legitimacy of the rewriting device by determining whether the converted data is formed from the predetermined data.

32. The control information rewriting system as in claim 30, wherein:

the electronic control unit is set to a condition for waiting for an input of the control information to be rewritten into the nonvolatile memory when determining that the rewriting device is legitimate.

33. The control information rewriting system as in claim 30, wherein:

the electronic control unit transmits specific information specific to a vehicle to the rewriting device; and

the rewriting device determines the control information to be transmitted to the electronic control unit based on the specific information.

34. The control information rewriting system as in claim 33, wherein:

the control information to be transmitted to the electronic control unit is determined by the control center based on the specific information.

35. A control information rewriting system for a vehicle comprising:

an electronic control unit mounted in the vehicle for a vehicle control and having a control program stored in electrically rewritable nonvolatile memory for the vehicle

control;

a rewriting device connectable to the electronic control unit for rewriting the control program; and

a control center for performing data communication with the rewriting device,

wherein the control center is programmed to determine whether the control program is normal by checking whether a check sum of the control program transmitted from the electronic control unit through the rewriting device along with a vehicle specific information, and transmit a new control program to the rewriting device so that the new control program is rewritten in the nonvolatile memory when determining that the control program is abnormal.